Effects of thermal and salinity stresses on growth of aposymbiotic and symbiotic primary polyps

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In order to better understand the effects of high thermal and low salinity stresses on coral calcification from the aspect of coral-algal symbiosis, aposymbiotic (lacking symbionts) and symbiotic coral primary polyps were experimentally exposed to several seawater temperatures (27 ~ 33°C) and salinities (26 ~ 34 treatments). Calcification rates of polyp skeletons with zooxanthellate (symbiotic) were higher than those without zooxanthellate (aposymbiotic) in both the experiments even under high thermal and low salinity stresses.

Symbiotic polyps showed non-linear calcification responses to thermal stresses whereas aposymbiotic demonstrated linear increase of calcification responses according to the increase of temperature. Both aposymbiotic and symbiotic polyps showed the linear decreases of calcification rates according to the decrease of salinity. Our results suggest that future global warming may have negative impact on coral calcification at the primary polyp processing symbionts. In addition, low salinity stress, which would be caused by increase of the intensity of local floods related to future climate change, would certainly decrease coral calcification.

Peridotite xenolith inferences on the formation and evolution of the central Siberian cratonic mantle

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Ongoing multi-disciplinary studies of large and fresh (LOI ≤1%) mantle xenoliths from the Udachnaya kimberlite in the central Siberian craton address the structure, composition and origin of cratonic lithospheric mantle. Petrographic data document successive deformation of coarse garnet peridotites (with strong crystal preferred orientation) to form: (1) olivine grains that are broken but not recrystallised, (2) porphyroclastic, (3) fluidal mosaic microstructures [1]. Extremely high sub-Moho velocities recorded in some seismic profiles in the craton may reflect strong anisotropy of foliated coarse peridotites [2]. Both sheared and coarse peridotites occur near the base of the lithosphere (≥1300°C, ~6.8 GPa). Oxygen fugacity decreases with depth. The major element composition of the majority of refractory peridotites is consistent with melt extraction at 1-5 GPa; Mg# is ≤0.929. These rocks are depleted in Pd, less commonly in Pt, relative to Os-Ir-Ru. Re-Os ages (T_{RD}) of the melt extraction residues range from 1.5 to 2.3 Ga (av. 1.8 Ga). 15-20% of coarse peridotites are enriched in opx and may have experienced silica addition in subduction settings.

The Proterozoic Re-Os T_{RD} ages of melt extraction residues from this and earlier [3] work indicate that most of the lithospheric mantle formed simultaneously with the assembly of the craton 1.8-2.1 Ga ago and is not coeval with the oldest exposed crustal rocks (2.6-3.5 Ga) [4]. More ancient mantle materials appear to come from volumetrically small terrains. The Siberian craton, and possibly other long-lived, thick, cold, diamond-bearing lithospheric domains, may have been created in the Paleoproterozoic rather than in the Archean.

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